



Figure 3.2.2. Comparison of the percent of the state's coastal habitat that represented various water quality conditions for selected water quality parameters and for the integrated water quality index.

anthropogenic inputs remains unclear and deserves further attention.

Tidal creek sites with very high TP concentrations were located in the upper Ashley River near Runnymede Plantation and Middleton Gardens (RT032046, RT041294; Appendix 2). This latter creek also had very high total nitrogen concentrations. Open water sites with very high TP concentrations were near the mouth of the Pee Dee River and in Winyah Bay near Belle Isle Gardens (RO046062, RO046064; Appendix 2).

Chlorophyll-*a*

Our measure of phytoplankton biomass in the water column is based on chlorophyll-*a* concentrations. Other phytoplankton pigments were also examined using HPLC analyses to determine phytoplankton composition (see Section 3.4). High chlorophyll-*a* concentrations provide an indication of possible estuarine eutrophication since phytoplankton respond rapidly to enriched nutrient concentrations and can form blooms that result in poor water quality (e.g., low DO, large DO variations) and the presence of harmful algal species. For SCECAP, chlorophyll-*a* concentrations ≤ 12 $\mu\text{g/L}$ are considered to be good. Chlorophyll-*a* values > 12 $\mu\text{g/L}$ represent the upper 75th percentile of all chlorophyll-*a* concentrations measured by the SCECAP program and are considered to be only fair. Chlorophyll-*a* concentrations above 20 $\mu\text{g/L}$ are considered to be high or poor based on criteria or guidelines published by Bricker *et al.* (1999) and the USEPA (2004).

The mean chlorophyll-*a* concentration was 11.8 $\mu\text{g/L}$ in creek habitats and 7.6 $\mu\text{g/L}$ at the open water sites. This difference was statistically significant ($p < 0.001$), but both means represent relatively low concentrations based on the SCECAP database (i.e., $< 75^{\text{th}}$ percentile). Using SCECAP criteria, 11% of the state's tidal creek and 1% of the open water habitat had chlorophyll-*a* concentrations considered to be poor (Figure 3.2.2). The slightly higher chlorophyll concentrations in tidal creeks may be reflective of the higher nutrient concentrations observed in the creeks. It may also reflect possible re-suspension of benthic algae from the creek bottoms and nearby marsh surfaces.

An analysis of the relationships between total nutrient concentrations and chlorophyll-*a* concentrations using all six years of available data showed very little correlation between TN and chlorophyll-*a* concentrations ($r^2 = 0.0185$) or between TP and chlorophyll-*a* concentrations ($r^2 = 0.0143$) (Figure 3.2.5). This is similar to the findings obtained by Van Dolah *et al.* (2004a) in previous survey periods of estuarine habitats. Similarly, Brock (2005) could find no relationships between phosphorus and chlorophyll-*a* concentrations in brackish stormwater ponds in SC. Therefore, the poor relationships between TN and TP and chlorophyll-*a* suggest a need to reconsider the utility of using nutrient concentrations as indicators of eutrophication. The lack of a good correlation with either nutrient parameter is likely due to a combination of nutrient-algae dynamics and the high tidal amplitude present in South Carolina estuaries, the latter of which reduces formation of blooms that might otherwise occur in more stagnant waters or in estuaries that have much lower tidal flow.

Fecal Coliform Bacteria

Fecal coliform bacteria are sampled as a measure of potential health hazard in estuarine waters related to primary contact recreation such as swimming and shellfish harvesting. State fecal coliform standards to protect primary contact recreation requires a geometric mean count that does not exceed 200 colonies/100 mL based on five consecutive samples in a 30-day period and no more than 10% of the samples can exceed 400 colonies/100 mL. To protect for shellfish consumption, the geometric mean shall not exceed 14 colonies/100 mL and no more than 10% of the samples can exceed 43 colonies/100 mL (SCDHEC, 2004). Since only a single fecal coliform count is collected at each site during SCECAP surveys, compliance with the standards cannot be strictly determined, but the data can provide some indication of whether the water body is likely to meet standards. For SCECAP, we consider any sample with ≤ 43 colonies/100 mL to be good. Samples with > 43 colonies/100 mL and < 400 colonies/100 mL represent fair conditions (i.e., potentially not supporting shellfish harvesting) and any sample with > 400 colonies/100 mL represents poor conditions (i.e., potentially not supporting primary contact recreation).